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## Who buffers income losses after job displacement? The role of alternative income sources, the family, and the state

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 Who Buffers Income Losses After Job Displacement?  
The Role of Alternative Income Sources, the Family, and the State

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# Who Buffers Income Losses After Job Displacement? The Role of Alternative Income Sources, the Family, and the State\*

## Abstract

Using survey data from the German Socio-Economic Panel (SOEP), this paper analyses to what extent alternative income sources, reactions within the household context, and redistribution by the state attenuate earnings losses after job displacement. Applying propensity score matching and fixed effects estimations, we find high individual earnings losses after job displacement and only limited convergence. Income from self-employment slightly reduces the earnings gap and severance payments buffer losses in the short run. On the household level, we find substantial and rather persistent losses in per capita labour income. We do not find that increased labour supply by other household members contributes to the compensation of the income losses. Most importantly, our results show that redistribution within the tax and transfer system substantially mitigates income losses of displaced workers both in the short and the long run whereas other channels contribute only little.

*Keywords: job displacement, plant closure, household income, SOEP*

*JEL Classification: D10, I38, J63, J65*

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# 1 Introduction

It is often stressed in the economic literature that reallocation – both among continuing firms and through firm entry and exit – is an important driver of productivity growth (see e.g. Syverson 2011) and therefore beneficial for an economy as a whole. However, from the affected workers' point of view, these reallocation processes generate “winners” and “losers”, the latter being those who suffer from involuntary job losses due to firm exits or mass layoffs that come along with reallocation and structural change. The importance of this issue is well reflected both in public policy debates and in the academic literature. Previous research has shown that job displacement has severe and long-lasting negative impacts on individual earnings (e.g. Jacobson et al. 1993, Couch and Placzek 2010, Hijzen et al. 2010). Besides, the literature has found serious impacts on non-monetary outcomes such as life-satisfaction, health, life expectancy, fertility decisions, and mental health of both displaced workers themselves and their spouses (see, e.g., Kassenboehmer and Haisken-DeNew 2009, Black et al. 2015, Sullivan and von Wachter 2009, Del Bono et al. 2012, Huttunen and Kellokumpu 2016, Marcus 2013).

While most of the hitherto existent literature focuses on individual earnings losses after job displacement, the focus of our analysis is on compensation mechanisms attenuating the effects of job displacement on disposable household income. More specifically, our paper contributes to the literature by investigating to what extent alternative income sources, reactions within the household context, and redistribution by the state buffer earnings losses after job displacement, thus highlighting the relative importance of each channel. Going beyond the standard individual level approach of the job displacement literature, looking at the household level provides meaningful insights for several reasons: Firstly, even though the number of single households has increased over the last decades, most people are still living in multi-person households.<sup>1</sup> Accordingly, negative income shocks as a consequence of job separations do not only affect a single person, but the entire household. Secondly, the household level is relevant for the provision of means-tested state transfers as they are usually assigned according to household rather than individual income (e.g., monetary assistance for long-term unemployed in Germany). The compensation of income losses through state transfers is particularly interesting as it reveals to what extent the state and the society as a whole compensate those who are negatively affected by reallocation processes and structural change.

To be sure, various studies have addressed selected channels of compensation, such as state transfers and increased labour supply of the spouse (e.g. Eliason 2011 for Sweden, Hardoy and Schøne 2014 for Norway), or alternative work arrangements such as self-employment (e.g. Farber 1999a for the US, von Greiff 2009 for Sweden). However, previous studies on self-employment entry after job loss did not investigate to what extent income from self-employment attenuates earnings losses after job displacement and we are – to the best of our knowledge – the first to analyse the buffering function of

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<sup>1</sup>According to census data, only 17% of the Germans lived alone in 2011 (Statistisches Bundesamt 2014).

this alternative income source. This is particularly interesting since social security data that are often used for analysing the earnings losses of displaced workers usually do not contain information on income from self-employment. Regarding redistribution by the state, our paper further contributes to the literature by shedding light on the redistributive impact of taxes and transfers in the context of job displacement under the rather comprehensive German welfare state regime. Moreover, as previous studies have addressed only selected channels of compensation, extant knowledge regarding the relative importance of various income sources for buffering income losses at the household level is rather limited so far and our analysis contributes to filling this research gap.

In accordance with the extant literature, our results show high losses in individual earnings as well as only limited convergence within five years after the displacement event. However, income from self-employment slightly reduces the earnings gap and severance payments buffer earnings losses in the short run. Looking at the household level our estimates show substantial and rather persistent losses in household labour income. Furthermore, we do not find that an added worker effect, i.e. increased labour supply by other household members, contributes to the compensation of income losses after job displacement. Whereas private non-labour income does not reduce income losses at all, redistribution by the state (i.e. taxes and transfers) substantially reduces the income gap. In total, compared to losses in pre-government household income, redistribution by the state reduces the income gap between displaced workers and their non-displaced counterparts by around 75 per cent in the short run and by 66 per cent in the long run. Accordingly, the German tax and transfer system substantially mitigates income losses of families affected by job displacement whereas individual reactions contribute only little to the compensation of income losses after job displacement.

In the following Section 2, we start off with a review of the related literature. In Section 3, we describe our data and show some first descriptive results. Section 4 presents the econometric approach and discusses the regression results as well as several conducted robustness checks. Section 5 concludes.

## **2 Related literature**

A large body of literature has dealt with the impacts of job displacement on different outcomes.<sup>2</sup> The international literature generally agrees in the finding that job displacement harms individual earnings of affected workers substantially (see e.g. Jacobson et al. 1993 and Couch and Placzek 2010 for the US, Hijzen et al. 2010 and Upward and Wright 2015 for the UK, Oreopoulos et al. 2008 for Canada, Eliason and Storrie 2006 for Sweden, Huttunen et al. 2011 for Norway). For Germany, empirical evidence on earnings losses after involuntary job loss is scarce and results are ambiguous due to different data, empirical approaches, and observation periods. Burda and Mertens (2001) use survey data from the German Socio-economic Panel (SOEP) to impute involuntary job losses in

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<sup>2</sup> Recent surveys of the literature on the consequences of job displacement are provided by Brand (2015), the OECD (2013), and von Wachter (2010). An overview of the theoretical reasons for income losses after job displacement is provided by Carrington and Fallick (2014).

administrative data from the Institute for Employment Research (IAB). They find slightly lower wage growth for displaced workers with the strongest effect for workers in the upper part of the pre-displacement wage distribution. Couch (2001) uses SOEP data to estimate the impact of job displacements due to firm closures on earnings and employment of German workers. He finds an immediate reduction in annual earnings by 13.5 per cent, which, two years later, diminishes to an earnings gap of 6.5 per cent.<sup>3</sup> Using administrative data from the Institute for Employment Research, Bender et al. (2002) find moderate wage losses of around 1-2 per cent after displacement,<sup>4</sup> but for workers who are not observed in employment in the year after displacement, an additional wage loss of 19 per cent is observed. Schmieder et al. (2010) observe more substantial earnings losses of displaced workers in Germany. In particular, they use administrative data to investigate the long-term impact of mass layoffs during the 1982 recession and find permanent earnings losses of 10-15 per cent that sustain for at least 15 years. They argue that these comparably large earnings losses are mainly due to the economic downturn of the early 1980s whereas displacements in the other studies occurred during periods of economic prosperity.

Our paper further relates to the literature dealing with compensation of individual earnings losses, in particular severance payments and self-employment entry. These income sources are often not included in administrative data, but the literature outlined below suggests that they might play a non-negligible role. Grund (2006) finds that severance payments are granted quite regularly in Germany and that they amount to around 9,200 € on average. However, his study does not investigate to what extent severance payments buffer earnings losses of displaced workers. Beyond that, alternative work arrangements can compensate earnings losses of those displaced workers. Against this background, Farber (1999a) finds for the US that job displacement increases the probability to work in temporary work arrangements and to be involuntarily part-time employed but he does not find a positive effect on the probability to become regularly self-employed. Von Greiff (2009), however, finds a substantial increase in the probability to enter self-employment subsequent to job displacement for Sweden. Similar results are obtained by Røed and Skogstrøm (2014) for Norway. Nevertheless, these studies focus on the effect of job loss on the probability to become self-employed whereas our study contributes to the literature by analysing to what extent income from self-employment buffers earnings losses after job displacement.

Beyond that, our paper contributes to the literature that deals with compensation mechanisms in the household context, namely the added worker effect, i.e. increased labour supply of the spouse as a reaction to involuntary job loss of the partner. Empirical evidence for the existence of an added worker effect is inconclusive. For instance, Lundberg (1985) finds only a small but significant added worker

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<sup>3</sup> Note that Couch (2001) considers only workers who are subsequently re-employed after displacement which causes earnings losses to be comparably low.

<sup>4</sup> The comparably low wage losses found by Bender et al. (2002) might be due to problems regarding the identification of job displacements. In particular, they identified plant closures only via disappearing plant IDs, which might also occur, for instance, due to changes of ownership or legal form.

effect for the US whereas Stephens Jr. (2002) finds substantial and persistent increases in the spouse's labour supply as a reaction to the husband's displacement. In a country comparison study, McGinnity (2002) analyses the added worker effect for Germany and the UK. Results show evidence for an added worker effect in Germany but not for the UK. Triebe (2015) uses SOEP data to analyse the added worker effect for Germany and finds it for both men and women and for married couples while there is no effect for cohabiting couples. Bredtmann et al. (2014) analyse the added worker effect for 28 European countries. An analysis for a pooled sample of these countries reveals that women whose husbands get displaced have a higher probability to enter the labour market and to change from part-time to full-time employment. Even though women's probability to enter the labour market increases when their husband becomes unemployed, this does not necessarily mean that they also find a job.<sup>5</sup> Against this background our paper contributes to the literature by investigating whether additional income generated by other household members compensates earnings losses after job loss.

Considering both the role of the spouse and the state to provide insurance after involuntary job loss, Ehlert (2012) uses survey data for Germany and the US to analyse the role of these sources for compensation in the two countries. He finds that if women get unemployed they are mainly insured by their spouses in both countries. Income losses of unemployed men in Germany are mainly buffered by the state while in the US they rely more on additional income provided by their families. However, Ehlert (2012) focuses only on transitions from employment to unemployment without taking the reason for job termination into account. Hardoy and Schøne (2014) analyse the role of the family and the welfare state to compensate income losses after job displacement in Norway, a country that is characterised by a very generous welfare state system and a large share of females participating in the labour market. It is found that the state plays a more important role than the spouse in compensating income losses after involuntary job loss. Eliason (2011) performs a comparable analysis for Sweden, a country with very similar institutions as Norway. He finds no evidence for an added worker effect and state transfers are able to compensate a substantial part of the income losses. However, the welfare state is also not able to fully compensate long-run earnings losses of displaced workers. For the UK, which is characterised by very modest welfare state institutions, Upward and Wright (2015) find that state transfers only slightly reduce the income gap after involuntary job loss.

In the following empirical analysis, we will investigate step by step to what extent the various compensation mechanisms outlined above buffer income losses of displaced workers and their families. Firstly, we follow the classic approach of the literature on income effects of involuntary job loss by examining the impact of job displacement on individual earnings from dependent employment. In addition to that, we are able to consider alternative income sources such as severance payments and self-employment. Secondly, we investigate compensation mechanisms on the household level, namely

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<sup>5</sup> For Greece, Giannakopoulos (2015) analysed the added worker effect for women whose husbands involuntarily lost their job during the economic crisis in Greece. While husbands' job loss made women enter the labour market, most of them did not actually start working but registered as unemployed making them formally eligible to receive state transfers.



redistribution by the state, private non-labour income, and labour income of other household members. With respect to the role of the state we distinguish the effects of income taxes, social security taxes, and state transfers such as unemployment benefits and social assistance.

### 3 Data and descriptive evidence

The German Socio-economic Panel (SOEP) is a household panel survey conducted on a yearly basis since 1984. All members of a household aged at least 16 are included in the survey. Starting with a sample of around 6,000 households and 12,000 individuals in 1984, the latest available wave conducted in 2013 by now includes almost 30,000 individuals living in around 11,000 households.<sup>6</sup> The data contain detailed information on socio-demographic characteristics of the respondents and their families as well as various job-related characteristics. The comprehensiveness of the contained income data allows us to gain fundamental insights about the effects of job displacement both on income losses of displaced workers themselves and in the household context.

Since it is the aim of our analysis to investigate how different compensation mechanisms succeed in filling the gap in the household budget after involuntary job loss, we consider eight different income variables. These variables stepwise include several income sources, such as severance payments, income from self-employment, non-labour income, and state transfers. The income variables used for our empirical analysis are described in Table 1. All income variables are deflated to prices in 2010 using the consumer price index. To make households of different size comparable when considering household income, we use equivalence weights according to the OECD-modified equivalence scale assigning a weight of 1 to the first adult, 0.5 to each additional person aged above 14 years, and 0.3 to each child aged 0 to 14 living in a household.<sup>7</sup> Equivalence weighting takes into account that costs of living do not increase one to one with the number of persons living in the household since numerous goods, such as heating, electricity, and facilities like washing machines or ovens, can be shared by the household members. Accordingly, using equivalence weighted household income allows us to quantify the average per capita income losses of all members of the affected household, including spouses and children, and is therefore more suitable than absolute household income to approximate losses in welfare and living standards of displaced workers and their families.<sup>8</sup>

Involuntary job loss is identified by the following questions: First, respondents are asked whether they have changed (or lost) their job since the last interview.<sup>9</sup> Those who have experienced a job change or

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<sup>6</sup> For more detailed information on the SOEP see Wagner et al. (2007).

<sup>7</sup> Note that our insights do not change when we use other equivalence scales such as the OECD equivalence scale and the square root scale. The OECD equivalence scale uses different weights, i.e. 1 for the first adult, 0.7 for each person aged above 14 years, and 0.5 for each child aged 0 to 14 living in the household. The square root scale uses weights by taking the square root of the total number of persons living in the household. Results are available on request.

<sup>8</sup> When using equivalence weights our results may be partly driven by changes in household size. However, looking at household sizes over time reveals that there are hardly any changes in average household size for both displaced and non-displaced workers. Moreover, we re-estimated our regressions including only households with the same household constellation within our time frame leaving our results unchanged as well.

<sup>9</sup> Note that many questions in the SOEP, such as earnings or time spent in, e.g., employment, unemployment or maternity leave, refer to the year preceding the interview. Concerning the recording of job changes individuals can indicate that the job change occurred in the previous

have become unemployed are subsequently asked for the reason of that change. For our empirical analysis we consider those workers as displaced who have lost their job due to firm closures and those who have been dismissed by their employers for other reasons. Job displacement can be defined as an “involuntary separation based on operating decisions of the employer” (Farber 1999b, p. 2445) implying that displaced workers are laid off due to reasons that are beyond their control and independent of their individual characteristics or performance. Accordingly, our definition of job displacement is broader as we also consider dismissed workers. However, this approach is in accordance with previous literature and corresponds to the definition of job displacement used in the Panel Study of Income Dynamics for the US, for example (see, e.g., Stevens 1997). Moreover, Grund (1999) finds no significant difference between post-displacement wages of displaced and dismissed workers in Germany.<sup>10</sup>

We consider involuntary job losses occurring between 1991 and 2008 and follow each of these displacement cohorts 4 years prior to and 5 years after job loss. For each displacement cohort we construct a control group that consists of individuals who did not experience an involuntary job loss (due to plant closures or other dismissals) in the respective year. They are nonetheless allowed to terminate employment voluntarily (e.g. due to own resignation or mutual agreements).<sup>11</sup> For the following analyses we consider workers who were full-time employed<sup>12</sup> non-civil servants aged under 55 in the year prior to displacement. The same sample restrictions are applied to the control group of non-displaced workers. In addition, due to the unusual economic conditions in Eastern Germany after the fall of the Berlin Wall and the limited period of observation, we consider only individuals working in firms situated in the western part of Germany in the year prior to displacement.

Figure 1 shows the development of individual and per capita household incomes (as described in Table 1) for displaced and non-displaced workers. Displacement occurs in year 0, which is referred to as the base year in the following. One can see from all income variables that displaced workers have on average lower incomes than non-displaced workers already before displacement. Moreover, individuals experience substantial cuts in all income variables after displacement. Data for the individual level further suggest that income from self-employment reduces these losses both in the short and the long run and severance payments<sup>13</sup> substantially lessen the income drop in the displacement year.

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year or in the year when the interview was conducted. Accordingly, it can occur that job displacements refer to the year of the interview whereas information on incomes and earnings refer to the previous year. We account for this problem by recoding the displacement year in such a way that all relevant variables refer to the year preceding the interview.

<sup>10</sup> As a robustness test we compared earnings losses of workers who have been displaced due to plant closures and those who have lost their jobs due to other reasons. The results (discussed in Section 4.3) reveal that income losses of dismissed workers are slightly higher whereas the broad picture of our results is not changed.

<sup>11</sup> Individuals who separated from their employers due to other reasons that cannot be unambiguously regarded as involuntary or voluntary terminations (e.g. because their job ended automatically due to a limited working contract) are excluded from both the treatment and the control group.

<sup>12</sup> Individuals who only work part-time in the year preceding displacement are excluded because we want to ensure that job displacement affects a major income source of the household and not only secondary incomes.

<sup>13</sup> See Grund (2006) for a description of the institutional background of severance payments in Germany.

Looking at the household level, which is more relevant for individual workers and their families, our results show that losses in equivalence weighted family labour income are overall smaller than on the individual level. This is mainly because losses are spread over all members of the household due to equivalence weighting. In contrast to income losses at the individual level, equivalence weighted household income takes into account that not only displaced workers themselves suffer from the income losses due to involuntary job loss, but other members of their households as well. Accordingly, this measure accounts for the fact that the number of persons affected by job displacements is much higher than the raw number of displaced workers. Another possible reason for lower income losses at the household level is additional labour income due to increased labour supply of other household members. Whether such an added worker effect contributes to compensating income losses will be investigated below. When comparing household labour income and total pre-government income one cannot see a substantial difference between these two income variables. This suggests that non-labour income sources such as income from assets or renting real estate that are included in the pre-government income variable do not buffer income losses after displacement. However, after subtracting the amount of yearly income taxes paid by the household, the gap is already substantially reduced. Additionally subtracting social security taxes further reduces the difference in incomes of displaced and non-displaced workers. Accordingly, taxes as a means of redistribution by the state remove a part of the income gap between displaced and non-displaced workers both prior to and after displacement. Looking at post-government income reveals that other state transfers (mainly unemployment benefits and social assistance) considerably reduce both permanent differences between displaced and non-displaced workers and the income drop after displacement. Accordingly, these descriptive results suggest that taxes and state transfers are important means to reduce income losses of displaced workers and their families, but there is hardly any convergence observable after displacement since the income gap remains rather constant after displacement.

Table 2 shows means of selected socio-demographic and job-related variables for displaced and non-displaced workers in the year prior to displacement. Displaced workers are on average younger and have less firm tenure and job experience than their non-displaced counterparts. Also, they have spent on average more time in unemployment. Moreover, displaced workers are on average less educated as they are, for example, more likely to have obtained at most general elementary education and less likely to have a university degree. These differences in human capital endowments are in line with the lower earnings of displaced workers already before displacement. Individuals affected by involuntary job loss also have a higher probability to be employed in small firms. This is in line with previous findings on the higher closing and job destruction rates of these firms.<sup>14</sup> It also corroborates with empirical evidence on the relationship between firm size and wages showing that workers in large

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<sup>14</sup> See, e.g., Fackler et al. (2013) for an analysis of the relationship between firm size and exit risk and Fuchs and Weyh (2010) for the relationship between firm size and job creation and destruction.

firms obtain higher wages than workers in small firms (see e.g. Fackler et al. 2015 for recent evidence for Germany).

Looking at the household composition, one can see that on average 3.00 persons including 0.76 children live in displaced workers' households, i.e. 3.00 persons and 0.76 children aged 0 to 18 among them are on average affected by one involuntary job loss and its consequences. The results further show that there are hardly any differences in household size and composition between displaced and non-displaced workers. Moreover, displaced workers have a higher probability to be unmarried and to be at risk to be poor.<sup>15</sup>

## 4 Econometric analysis

### 4.1 Estimation approach

In the following econometric analysis we combine a matching approach with fixed effects estimations. This allows us to take account of both differences in observable pre-displacement characteristics and differences in time-invariant unobserved characteristics.

In the first step we perform 1-to-1 nearest neighbour propensity score matching without replacement. To make sure that we compare displaced and non-displaced workers facing similar general economic conditions, we only allow for matches within the same base year. As covariates for the computation of the propensity score we include various socio-demographic characteristics (age, age squared, gender, marital status, number of children, household size, an indicator for living in an urban or rural area, and the federal state someone is currently living in), as well as variables representing educational attainment and employment histories (level of education, work experience in full-time and part-time employment, work experience in full-time and part-time employment squared, years of unemployment, years of unemployment squared, firm tenure, firm tenure squared, 2-digit industry, and firm size). These characteristics refer to the year before displacement. After matching, we end up with a sample of 1,733 displaced workers and the same number of non-displaced counterparts.<sup>16</sup> Test results for the matching quality show that, except for one out of more than 50 covariates, there are (on the 5% significance level) no significant differences between displaced and non-displaced workers in the matched sample. Moreover, the median (mean) of the standardized bias is reduced from 6.0 (10.2) in the unmatched sample to 1.6 (2.0) in the matched sample.<sup>17</sup>

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<sup>15</sup> It is commonly defined that individuals whose equivalence weighted household income is lower than 60% of the median income are at risk to be poor.

<sup>16</sup> Note that the number of displaced workers in the matched sample is slightly higher than in the descriptive analysis (Table 2) because we excluded individuals with missing values in any of the covariates in Table 2 in the descriptive analysis. For matching we included dummy variables for missing values in categorical variables.

<sup>17</sup> Caliendo and Kopeinig (2008) state that a standardized bias below 3 or 5% can be regarded as sufficient. More detailed results of the balancing tests are available on request.

The subsequently estimated fixed effects regressions take on the following form:

$$Y_{it} = \alpha_i + \sum_{k=-3}^5 \gamma_k T_k + \sum_{k=-3}^5 \delta_k D_i T_k + v_{it}$$

On the left hand side,  $Y_{it}$  represents the different income variables on the individual and the household level (for person  $i$  in year  $t$ ).  $\alpha_i$  captures individual fixed effects.  $T_k$  represents dummies for the  $k^{\text{th}}$  year relative to the base year and  $\gamma_k$  the corresponding coefficients measuring the income development for the control group.  $D_i T_k$  represents interaction terms of the relative time dummies  $T_k$  with a time invariant dummy  $D_i$  identifying displaced workers. The corresponding coefficients of these interaction terms  $\delta_k$  catch the effect of relative time to displacement and measure the difference in the income development between displaced and non-displaced workers.  $v_{it}$  is an idiosyncratic error. Standard errors are adjusted for clustering at the personal level.

## 4.2 Results

Figure 2 shows the coefficients  $\delta_k$  of the interaction terms between the relative time dummies and the displacement dummy. Overall, our results for individual earnings corroborate with previous findings as they show substantial and persistent earnings losses for displaced workers.<sup>18</sup> Losses are highest in the first year after displacement and there is only little convergence observable in the subsequent years. Starting with individual labour earnings without severance payments and without income from self-employment – the type of income also contained in German administrative data – we find that displaced workers suffer a severe earnings loss of around 12,900 € in the first year after displacement compared to their non-displaced counterparts which corresponds to a percentage loss of around 40 per cent. Five years after displacement, the earnings gap between displaced and non-displaced workers has shrunk only to about 7,400 € or 25 per cent indicating that there is only little convergence in earnings from dependent employment within our period of observation. Including income from self-employment reduces the earnings gap both in the short and the long run, but only to a small extent (around 1,000 € per year). Severance payments reduce the earnings drop substantially in the year of displacement and slightly in the first year after the job loss, but – as expected – have no effect in the long run.<sup>19</sup> Overall, involuntary job loss has a strong negative impact on individual earnings and workers hardly recover from this shock within the time span considered in our analysis.

To get some insights into the employment patterns behind the above presented results, Figure 3 depicts the shares of individuals in full-time employment and employment in full- or part-time. Note that all individuals are required to be full-time employed in the year prior to job loss. Remarkably, there is hardly any difference in the share of part-time employed individuals (i.e. the difference between the

<sup>18</sup> Tables with complete estimation results for the individual level, including confidence intervals, are provided in Appendix Tables A1-A3.

<sup>19</sup> Regarding severance payments, our results are in line with those by Grund (2006) who provides a comprehensive analysis of the frequency and magnitude of severance payments in Germany.

share of individuals in full- or part-time and the share of individuals in full-time employment) between displaced and non-displaced workers during the whole period of observation. In contrast to the results by Farber (1999a), our results therefore do not point to an increased probability of part-time employment for displaced workers. Figure 3 further shows that before displacement, employment patterns are very similar for displaced and non-displaced workers. In the year of displacement we observe a huge drop in the employment shares for displaced workers with differences of around 40 percentage points between displaced and non-displaced workers. In the following year, the differences are reduced to around 25 percentage points and further decrease in the following years. Five years after displacement, displaced workers have around ten percentage points lower employment probabilities than their non-displaced counterparts which is mainly driven by decreasing employment shares of the latter group. This is because we do not impose any restrictions on non-displaced workers regarding their employment status, except for the year prior to job loss.

The above mentioned buffering effect of self-employment entry is also well reflected in the self-employment shares of displaced and non-displaced workers depicted in Figure 4. Before displacement, there is hardly any difference in the self-employment share between displaced and non-displaced workers. Note that all individuals are required to work in dependent employment in period  $t = -1$ . Consequently, from  $t = -1$  onwards the self-employment share for non-displaced workers increases steadily over time up to a share of around 4 per cent in period  $t = 5$ . For displaced workers, we find a sharp increase in the self-employment share of around 5 percentage points between  $t = -1$  and  $t = 1$ . In the year after displacement, the difference in the probability of self-employment between displaced and non-displaced workers amounts to around 3 percentage points and remains rather stable over the following years. Thus, job displacement increases the probability of becoming self-employed, which is in line with previous findings by, e.g., von Greiff (2009).

Figure 5 shows the losses in equivalence weighted household incomes.<sup>20</sup> In the first year after displacement, we find a gap in household labour income between displaced and non-displaced workers of around 6,600 € and after five years there is still a gap of around 3,800 €. As stated in Section 3, losses in equivalence weighted household income measure the average per capita effects of involuntary job loss for each member of affected households. Losses in equivalence weighted incomes are by definition lower than on the individual level because losses are spread over all members of the household.<sup>21</sup> The added worker effect, i.e., increased labour supply of the partner as a reaction to an individual's job loss, can be another reason for lower labour income losses on the household than one the individual level. To check this hypothesis, we re-estimated our regression with the (unweighted) labour income of all other household members but the displaced worker's as dependent variable. The estimation results that are presented in Figure 6 show that there is no clear-cut relationship between job displacement and labour income of other household members, not least because the respective

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<sup>20</sup> Tables with complete estimation results for the household level, including confidence intervals, are provided in Appendix Tables A4-A8.

<sup>21</sup> Results for household incomes without equivalence weighting are provided in Appendix Figure A1

coefficients are not statistically significant at all. Hence, an added worker effect does not seem to contribute to compensating income losses after job displacement.<sup>22</sup>

Results for total pre-government income are almost identical to those for household labour income revealing that the additional income sources comprised in pre-government income (income from assets, private transfers and private pensions) do not reduce the income gap between displaced and non-displaced workers. One could expect, e.g., that displaced workers react to the job loss by renting out real estates or by selling assets to buffer their income losses (if possible). However, as we do not find a buffering effect of private non-labour income, it seems that displaced workers do not have access to these additional income sources. Considering redistribution by the state through income and social security taxes, our results reveal that net household income drops by 3,500 € in the first year after displacement and by 1,900 € after five years. Hence, compared to pre-government household income, taxes reduce the income gap between displaced and non-displaced workers by around 45 per cent in the short run and 47 per cent in the long run. Distinguishing between income and social security taxes, we find that both kinds of taxes are equally important for buffering income losses of displaced workers on the household level.

Finally, the results for post-government household income show even more moderate losses. In the year of displacement there is, surprisingly, a slightly positive effect on post-government income that can be explained as follows: Remember that there is only a comparably small reduction in household labour income in the year of displacement. The reason is that displaced workers receive severance payments that reduce the income drop in the displacement year substantially (as shown in our analysis for the individual level). In addition, most displaced workers already receive unemployment benefits in the year of displacement explaining why post-government income is *ceteris paribus* higher for displaced workers than for their non-displaced counterparts. While the largest drop in the other income variables is observable in the year after displacement, we find the highest but still moderate gap in post-government income (around 1,900 €) in the second year after displacement. This can be explained by the fact that unemployment benefits, which depend on earnings before job loss, are usually paid for one year in Germany. Hence, workers who do not find a new job within one year experience an additional drop in post-government household income as unemployment benefits are substantially cut down to means-tested social assistance. In the third year, a process of convergence seems to start and after five years, we observe only an income gap of around 1,000 € in post-government income of displaced workers compared to their non-displaced counterparts.

To sum up, our results corroborate with the extant literature as we find substantial and rather persistent losses in individual earnings. The results for the household level reveal that gross income losses are

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<sup>22</sup> As reactions of household members might be different depending on the gender of the person who lost her job, we additionally ran separate estimations for men and women. This is because men are still more often the main earner of the family whereas it is more common for women to provide a secondary income for the household budget or they even do not work at all. However, again we do not find evidence for an added worker effect.

still substantial and long-lasting. State interventions in terms of redistribution through taxes and transfers reduce the gap in per capita household income between displaced workers and their non-displaced counterparts by around 75 per cent in the short run and by 66 per cent in the long run and therefore play an important role in compensating the income losses of displaced workers and their families.

### **4.3 Robustness tests**

Beyond the results presented above, we have run a number of robustness tests (results are available on request). First, we ran separate regressions for male and female job loss due to potential differences in wage levels and labour supply. On both the individual and the household level we find very similar patterns for displaced men and women. Second, our period of observation includes one of the most extensive labour market reforms of the last decades in Germany, namely the Hartz reforms. The implementation of this labour market policy reform that included severe impacts on state transfers for unemployed workers and their families began in January 2003 (see, e.g., Huefner and Klein 2012 for more details on the Hartz reforms). Hence, one could suspect that post-government household income losses were affected by this reform. In order to test this, we run separate regressions for workers displaced prior to and since 2003, respectively. We find overall very similar patterns to our baseline results even though losses on the household level are slightly higher for workers who experienced an involuntary job loss before the Hartz reforms. However, it must be kept in mind that the two groups lost their jobs under different macro-economic conditions so that lower losses of workers displaced after the Hartz reforms cannot be unambiguously ascribed to this particular change in labour market policies.

Third, we address the fact that we included both workers who lost their jobs due to plant closures and due to dismissals in our sample of displaced workers. Gibbons and Katz (1991) find that dismissed workers have higher earnings losses than workers displaced due to plant closures. They argue that this is due to stigma effects that might occur because dismissed workers are assumed to be selected based on their ability whereas this type of within-plant selectivity is not possible in case of plant closures. For Germany, Grund (1999), however, does not find differences in earnings losses of dismissed workers and those affected by plant closures at all. To examine whether there is a difference in income losses between these two kinds of displaced workers, we include interaction terms in our baseline estimations to segregate the effects of involuntary job loss for dismissed workers and workers displaced because of plant closures. Our results indicate no significant differences in individual income losses between displaced and dismissed workers. Only regarding income including severance payments we find higher losses for dismissed than displaced workers suggesting that displaced workers receive higher severance payments than dismissed workers which is in line with findings by Grund (2006). Correspondingly, income losses of dismissed workers are also slightly higher on the household level but our main insights are not affected.



Fourth, we address the problem that job losses, in particular due to plant closures, might be anticipated by affected plants' work forces allowing employees to strategically react to an up-coming displacement event by leaving their firm before it finally closes down. In this context, Schwerdt (2011) finds that so-called "early leavers", i.e. those workers who leave closing plants already before the final shut-down, have better post-displacement outcomes than those who stay until the end. Accordingly, this implies that those who stay until the end are a rather selective group of low ability workers, which is why studies that make use of linked employer-employee data include early leavers in the group of displaced workers. Since this is not possible with our data, we address this aspect by making use of a question included in the SOEP that asks individuals about their self-assessed job security and re-estimate our baseline models distinguishing expected and unexpected job losses. Overall, individuals who expected the job loss have slightly higher individual earnings losses than those who did not see the job loss coming. Interestingly, higher income losses in case of expected job loss are not observable at the household level. Hence, we conducted an analysis of the added worker effect differentiated by expected and unexpected job loss in order to check whether this better adaptation of households who expected the job loss is reflected in increased labour incomes of other household members. The results show that there is indeed a positive effect of expected involuntary job loss on household labour income of all other household members (effects are statistically significant in the second, third, and fifth year subsequent to the job loss). Unexpected job losses, however, do not significantly affect household labour incomes of other household members.

Finally, we re-run our baseline regressions excluding certain groups of workers in order to make sure that our results are not driven by particularly disadvantaged subgroups, i.e. old and low educated workers. Our estimation results show that, as expected, losses in both individual and household income are slightly lower when we exclude workers who are older than 50 years in the year before displacement. Potential reasons are that older workers have more tenure and therefore more specific human capital that suddenly becomes worthless. In addition, older workers have lower re-employment probabilities (Dietz and Walwei 2011). Next, we exclude those individuals who do not have any school degree at all in the year before displacement. Results show overall very similar losses both in individual earnings and household incomes suggesting that low educated workers do not particularly drive our results.

## **5 Conclusion**

Using household survey data from the German Socio-economic Panel (SOEP) we have investigated the impact of job displacement on individual and household income of affected workers and their families. On the individual level, we find substantial and rather persistent earnings losses of displaced workers compared to their non-displaced counterparts. Furthermore, our results reveal that income from self-employment slightly reduces individual earnings losses in the short and in the long run. Severance payments buffer the earnings drop considerably in the year of displacement and slightly one

year later, but – as expected – have no impact in the longer run. However, even when these additional income sources are considered, there is still only limited convergence observable as the earnings gap between displaced and non-displaced workers is only reduced by around one half within five years after displacement. This indicates that job displacement has a severe and long-lasting negative impact on earnings trajectories of affected individuals. These results for the individual level are in line with the bulk of the extant literature showing that involuntary job loss causes severe and persistent individual earnings losses (e.g., Jacobson et al. 1993, Couch and Placzek 2010 for the US, Upward and Wright 2015 for the UK, Schmieder et al. 2010 for Germany).

Looking at the household level reveals substantial and rather persistent losses in household labour income. Estimates for net household income show that redistribution by the state through income and social security taxes considerably reduces the income gap after involuntary job loss. Finally, when we look at post-government household income, we find that state transfers further reduce the remaining income gap between displaced and non-displaced workers substantially. In total, redistribution by the state reduces the gap in per capita household income between displaced workers and their non-displaced counterparts by around 75 per cent in the short run and by 66 per cent in the long run. With respect to the labour supply reactions of other household members after involuntary job loss our results are in line with previous literature as many studies do not find that the added worker effect is an important channel of compensation (see, e.g., Eliason 2011 and Hardoy and Schøne 2014). Also, previous literature has shown that state transfers are an important means to buffer income losses after involuntary job loss, but to a larger extent in social welfare state regimes like the Scandinavian countries than in liberal welfare states as the US or the UK (see, e.g., Upward and Wright 2015 and Hardoy and Schøne 2014).<sup>23</sup> To sum up, our results reveal that the German tax and transfer system substantially mitigates income losses of families affected by job displacement whereas individual reactions contribute only little to the compensation of the earnings losses after job displacement.

Despite our findings that the state considerably reduces income losses of displaced workers and their families, it must be kept in mind that this paper only deals with the monetary effects of involuntary job loss. Job displacement may still have severe negative effects, e.g., on health, life satisfaction, mortality, divorce rates and employment outcomes of affected workers as it has also been found for Germany and other countries with generous welfare state regimes (e.g., Marcus 2013, Kassenboehmer and Haisken-DeNew 2009, Eliason 2012). Moreover, spill over effects may be an important issue as involuntary job loss negatively affects educational attainment and future employment outcomes of children of displaced workers (see, e.g., Brand and Thomas 2014 for the US, Oreopoulos et al. 2008 for Canada). Accordingly, even though state transfers seem to be effective in securing the economic situation of the family, the disruption of daily structures, social contacts, and social acceptance that are accompanied by a job loss are further aspects that are not reflected in the pure monetary effects of job

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<sup>23</sup> See Joumard et al. (2012) for an assessment of the redistributive impact of the tax and transfer systems across OECD countries.

losses. Although the German welfare state is able to buffer income losses of displaced workers and their families quite well, the high and persistent individual earnings losses suggest that individuals do not recover that easily from involuntary job loss. Beyond pure monetary support, more targeted active labour market policies may be suitable means to improve the employment prospects of displaced workers. Against this background, it has been shown for Germany that start-up subsidies can improve both the earnings and employment situation of previously unemployed workers (Caliendo and Kuenn 2011).

Moreover, one has to keep in mind that redistribution and transfers by the state may affect individual job search behaviour. With respect to unemployment benefits, empirical evidence has shown a clear positive relationship between the length of unemployment benefit reception and unemployment duration (e.g. Schmieder et al. 2012) whereas analyses of long-term effects on post-unemployment wages have rendered ambiguous results. On the one hand it can be argued that longer unemployment benefit duration allows individuals to find better and more stable employment being in favour of longer unemployment benefit durations (see, e.g., Nekoei and Weber 2015). On the other hand longer unemployment benefit durations can make individuals reluctant to search intensely for a new job. This may cause longer unemployment duration, which is accompanied by skill depreciations and stigmatization and, hence, lower post-unemployment wages (see, e.g., Schmieder et al. 2016). Taken together, one cannot clearly state to what extent the state should provide compensation of income losses after involuntary job losses because the incentives imposed on individuals by the welfare state must always be taken into account. One may even suspect that generous welfare state regimes make displaced workers more reluctant to re-enter the labour market and are therefore responsible for high and persistent individual earnings losses. However, studies for countries with less generous welfare states find similar individual earnings trajectories for displaced workers (e.g. Upward and Wright 2015 for the UK, Couch and Placzek 2010 for the US) whereas earnings losses tend to be comparably low in Nordic countries with more generous welfare states (OECD 2013). Hence, one cannot conclude that redistribution by the state prevents displaced workers from overcoming the negative consequences of job loss by individual effort. Further research on the role of different compensation mechanisms and the associated incentives under different institutional settings is therefore needed.

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## Tables

| <b>Income variable</b>                              | <b>Description</b>  |
|---|---|
| Individual labour income from dependent employment  | Yearly gross individual labour income from dependent employment, without income from self-employment and severance payments   |
| Individual labour income without severance payments | Yearly gross individual labour income from dependent employment and income from self-employment without severance payments  |
| Individual labour income                            | Yearly gross individual labour income including income from self-employment and severance payments  |
| Household labour income                             | Yearly gross labour income of all household members   |
| Pre-government household income                     | Yearly gross income of all household members from labour earnings, private transfers, private pensions, and asset income  |
| Pre-government household income minus income taxes  | Yearly gross income of all household members from labour earnings, private transfers, private pensions, and asset income minus household federal (income) taxes                     |
| Household net income                                | Yearly gross income of all household members from labour earnings, private transfers, private pensions, and asset income minus federal (income) and social security (payroll) taxes |
| Post-government household income                    | Yearly post-government income of all household members (all income sources including state transfers, after taxes)  |

**Table 1: Description of income variables.**

Note: All income variables are deflated to 2010 prices; household incomes are equivalence weighted using the OECD-modified equivalence scale.

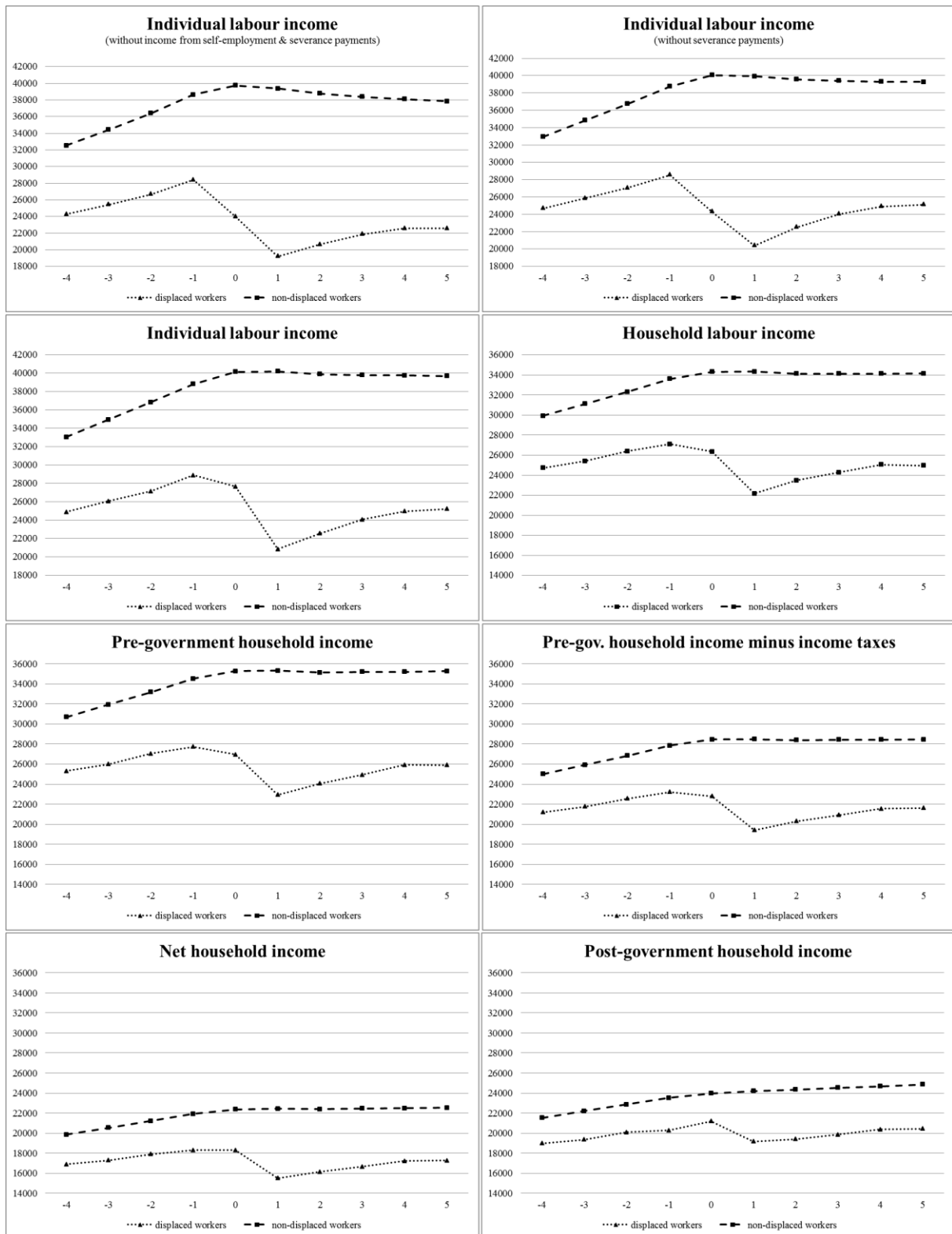


|   | <b>Displaced</b> |           | <b>Non-displaced</b> |           |
|---|------------------|-----------|----------------------|-----------|
|   | Mean             | Std. Dev. | Mean                 | Std. Dev. |
| <b>Age</b>                              | 36.4187          | 9.6264    | 38.7948              | 9.2036    |
| <b>Female</b>                           | 0.2931           | 0.4553    | 0.3119               | 0.4633    |
| <b>Firm tenure (years)</b>              | 4.7423           | 6.4548    | 9.5669               | 8.3903    |
| <b>Job experience (years)</b>           | 12.5937          | 9.3035    | 15.3258              | 9.5409    |
| <b>Unemployment experience (years)</b>  | 0.8267           | 1.5459    | 0.3757               | 1.0370    |
| <b>Firm size (dummies)</b>              |                  |           |                      |           |
| ≤ 20                                    | 0.3583           | 0.4796    | 0.1839               | 0.3874    |
| 21-199                                  | 0.3486           | 0.4767    | 0.2803               | 0.4492    |
| 200-1999                                | 0.1698           | 0.3756    | 0.2700               | 0.4440    |
| 2000 or more                            | 0.1233           | 0.3288    | 0.2657               | 0.4417    |
| <b>Level of education (dummies)</b>     |                  |           |                      |           |
| No school degree at all                 | 0.0544           | 0.2268    | 0.0320               | 0.1759    |
| General Elementary                      | 0.1807           | 0.3849    | 0.1319               | 0.3384    |
| Middle Vocational                       | 0.5420           | 0.4984    | 0.5214               | 0.4995    |
| Vocational plus Abi                     | 0.0574           | 0.2327    | 0.0728               | 0.2598    |
| Higher Vocational                       | 0.0610           | 0.2395    | 0.0843               | 0.2778    |
| Higher Education                        | 0.1045           | 0.3060    | 0.1576               | 0.3644    |
| <b>Marital status (dummies)</b>         |                  |           |                      |           |
| Married                                 | 0.5396           | 0.4986    | 0.6319               | 0.4823    |
| Divorced/ separated                     | 0.0985           | 0.2981    | 0.0804               | 0.2720    |
| Unmarried                               | 0.3505           | 0.4773    | 0.2776               | 0.4478    |
| Other                                   | 0.0115           | 0.1066    | 0.0101               | 0.0998    |
| <b>Household size (no. of persons)</b>  | 3.0030           | 1.4656    | 3.0367               | 1.3832    |
| <b>Number of children (&lt;18)</b>      | 0.7631           | 1.0487    | 0.7693               | 1.0216    |
| <b>Number of children (&lt;7)</b>       | 0.1396           | 0.3467    | 0.1193               | 0.3242    |
| <b>Household type (dummies)</b>         |                  |           |                      |           |
| Single                                  | 0.1396           | 0.3467    | 0.1193               | 0.3242    |
| Multi-person household without children | 0.4121           | 0.4924    | 0.4308               | 0.4952    |
| Multi-person household with children    | 0.4483           | 0.4975    | 0.4499               | 0.4975    |
| <b>Poor (dummy)</b>                     | 0.0918           | 0.2889    | 0.0296               | 0.1695    |
| <b>Number of observations</b>           | 1,655            |           | 52,828               |           |

**Table 2: Means of selected variables for displaced and non-displaced workers.**

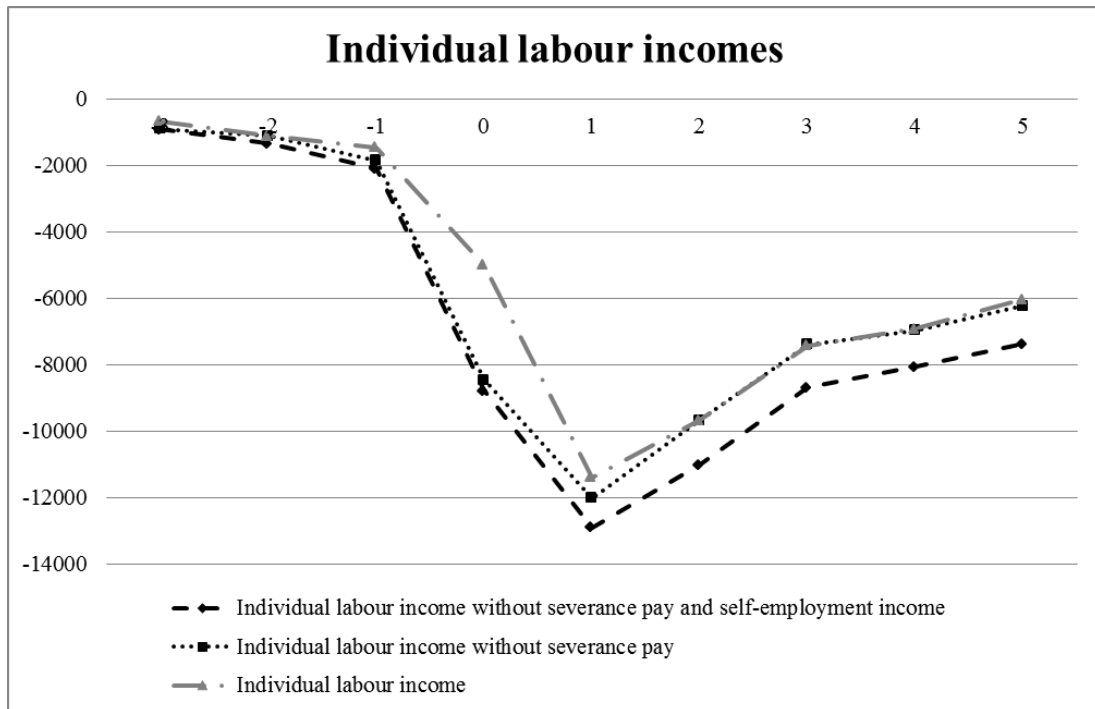
Notes: Displacement cohorts 1991-2008; age refers to the year of displacement, all other variables refer to the year before displacement; only individuals with non-missing information on all included characteristics as well as the income variables in the year before displacement.

## Figures



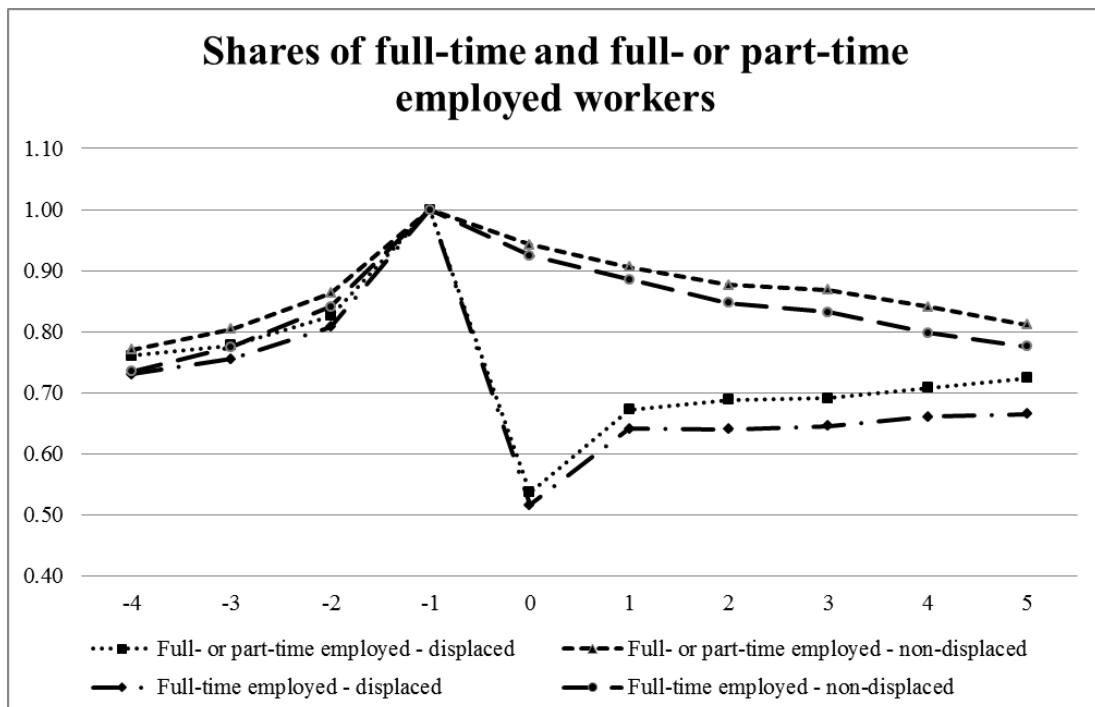
**Figure 1: Incomes of displaced and non-displaced workers over time (means).**

Notes: Displacement cohorts 1991-2008; years relative to the base year on the horizontal axis; yearly incomes in Euro deflated to prices in 2010 on the vertical axis; only individuals with non-missing information on the covariates in Table 2 as well as any of the income variables in the year prior to displacement; household incomes are equivalence weighted using the OECD-modified equivalence scale.



**Figure 2: Individual labour income of displaced relative to non-displaced workers over time.**

Notes: Fixed effects estimates, matched sample; displacement cohorts 1991-2008; years relative to the base year on the horizontal axis; yearly incomes in Euro deflated to prices in 2010 on the vertical axis; see Appendix Tables A2-A4 for the corresponding regression results.



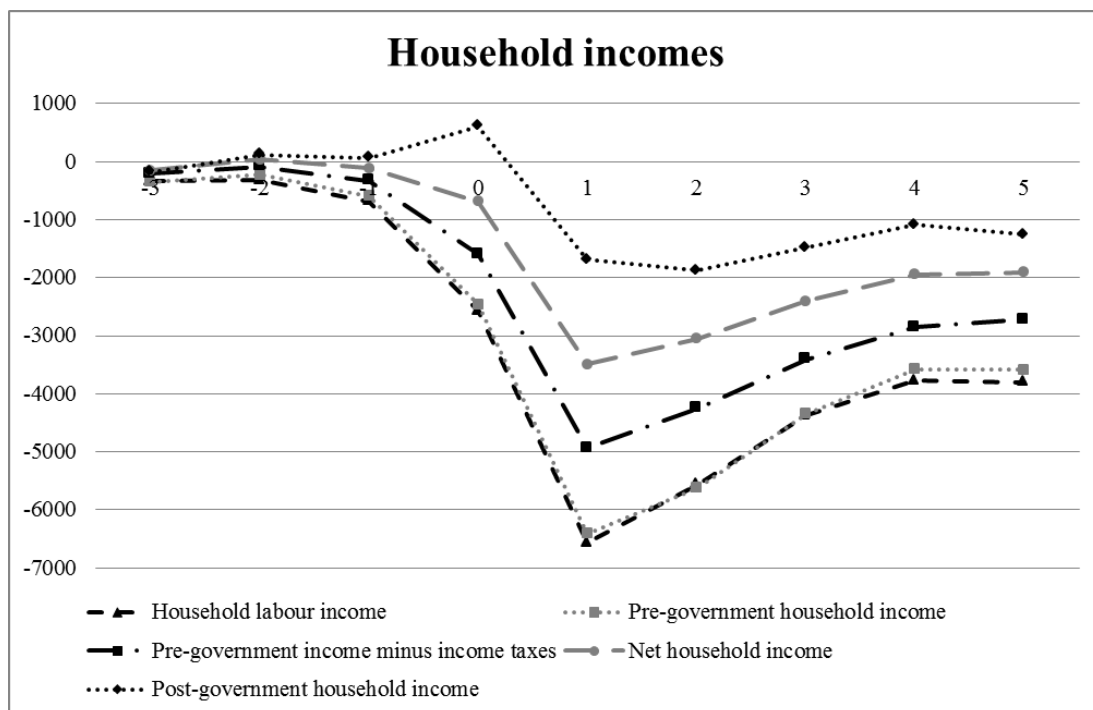
**Figure 3: Shares of full-time and full- or part-time employed displaced and non-displaced workers.**

Notes: Matched sample; displacement cohorts 1991-2008; years relative to the base year on the horizontal axis; shares of individuals per group working in full-time and full- or part-time employment on the vertical axis.



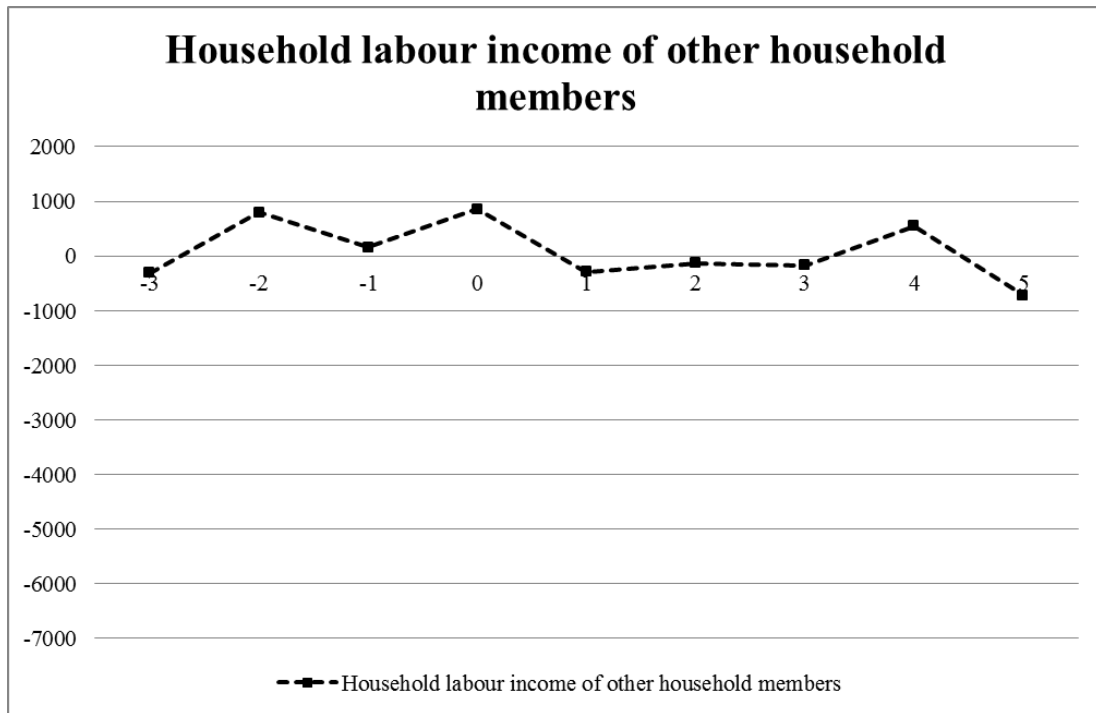
**Figure 4: Shares of self-employed displaced and non-displaced workers.**

Notes: Matched sample; displacement cohorts 1991-2008; years relative to the base year on the horizontal axis; shares of individuals per group in self-employment on the vertical axis.



**Figure 5: Per capita household income of displaced relative to non-displaced workers over time.**

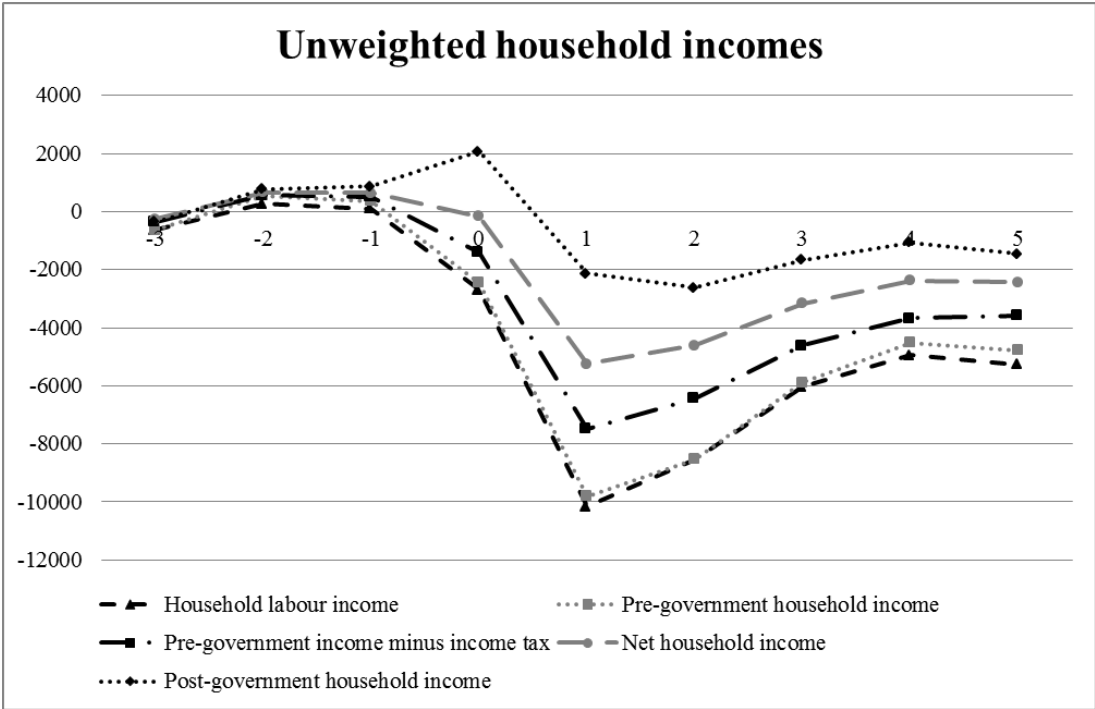
Notes: Fixed effects estimates, matched sample; displacement cohorts 1991-2008; years relative to the base year on the horizontal axis; yearly incomes in Euro deflated to prices in 2010 on the vertical axis; equivalence weighted income using the OECD-modified equivalence scale; see Appendix Tables A5-A9 for the corresponding regression results.



**Figure 6: Labour income of other members of displaced workers' households over time, displaced relative to non-displaced workers.**

Notes: Fixed effects estimates, matched sample; displacement cohorts 1991-2008; years relative to the base year on the horizontal axis; yearly incomes in Euro deflated to prices in 2010 on the vertical axis.

APPENDIX



**Figure A1: Unweighted household income of displaced relative to non-displaced workers over time.**  
 Notes: Fixed effects estimates, matched sample; displacement cohorts 1991-2008; years relative to the base year on the horizontal axis; yearly incomes in Euro deflated to prices in 2010 on the vertical axis.

**Dependent variable:**

Individual labour income without income from self-employment and severance pay

| <i>Years before/ after displacement</i> | Coefficient  | t-value | 95% Conf. Interval |           |
|---|--------------|---------|--------------------|-----------|
| 3 years before*displaced                | -902.43*     | -1.73   | -1923.91           | 119.04    |
| 2 years before*displaced                | -1320.95**   | -2.27   | -2460.32           | -181.59   |
| 1 year before*displaced                 | -2090.67***  | -3.75   | -3183.75           | -997.58   |
| Year of displacement*displaced          | -8772.91***  | -14.76  | -9938.41           | -7607.41  |
| 1 year after*displaced                  | -12895.20*** | -16.40  | -14436.75          | -11353.64 |
| 2 years after*displaced                 | -11004.21*** | -14.53  | -12489.08          | -9519.34  |
| 3 years after*displaced                 | -8681.19***  | -10.81  | -10255.50          | -7106.88  |
| 4 years after*displaced                 | -8049.54***  | -9.83   | -9655.06           | -6444.02  |
| 5 years after*displaced                 | -7373.72***  | -8.14   | -9150.74           | -5596.71  |
| 3 years before                          | 1941.12***   | 5.14    | 1200.26            | 2681.98   |
| 2 years before                          | 3512.25***   | 8.92    | 2740.57            | 4283.93   |
| 1 year before                           | 6007.93***   | 15.21   | 5233.25            | 6782.61   |
| Year of non-displacement                | 8293.99***   | 20.91   | 7516.08            | 9071.90   |
| 1 year after                            | 7737.74***   | 16.56   | 6821.78            | 8653.69   |
| 2 years after                           | 7073.08***   | 15.35   | 6169.84            | 7976.33   |
| 3 years after                           | 5692.17***   | 11.10   | 4686.75            | 6697.58   |
| 4 years after                           | 5446.54***   | 9.59    | 4332.60            | 6560.48   |
| 5 years after                           | 4701.07***   | 7.58    | 3485.14            | 5917.01   |
| Constant                                | 24546.96***  | 97.35   | 24052.54           | 25041.38  |
| No. of observations:                    | 30144        |         |                    |           |
| No. of groups:                          | 3466         |         |                    |           |
| R <sup>2</sup> :                        | 0.0379       |         |                    |           |

**Table A1: Effects of job loss on individual labour income without income from self-employment and severance pay.**

Notes: Fixed effects estimates, matched sample; displacement cohorts 1991-2008; yearly incomes in Euro deflated to prices in 2010; \*denotes significance at the 10% level, \*\*at the 5% level and \*\*\*at the 1% level.

**Dependent variable:**

Individual labour income without severance pay

| <i>Years before/ after displacement</i> | Coefficient  | t-value | 95% Conf. Interval |           |
|---|--------------|---------|--------------------|-----------|
| 3 years before*displaced                | -878.00*     | -1.70   | -1890.40           | 134.40    |
| 2 years before*displaced                | -1090.57*    | -1.90   | -2215.62           | 34.49     |
| 1 year before*displaced                 | -1841.69***  | -3.37   | -2913.13           | -770.25   |
| Year of displacement*displaced          | -8443.04***  | -14.47  | -9587.16           | -7298.91  |
| 1 year after*displaced                  | -12013.90*** | -15.22  | -13561.78          | -10466.03 |
| 2 years after*displaced                 | -9669.20***  | -13.23  | -11102.19          | -8236.20  |
| 3 years after*displaced                 | -7377.04***  | -9.37   | -8920.28           | -5833.81  |
| 4 years after*displaced                 | -6964.05***  | -8.77   | -8521.17           | -5406.94  |
| 5 years after*displaced                 | -6211.95***  | -7.02   | -7946.47           | -4477.42  |
| 3 years before                          | 1878.65***   | 4.93    | 1130.91            | 2626.40   |
| 2 years before                          | 3273.31***   | 8.17    | 2487.49            | 4059.13   |
| 1 year before                           | 5501.58***   | 13.93   | 4727.03            | 6276.12   |
| Year of non-displacement                | 7944.84***   | 20.19   | 7173.23            | 8716.44   |
| 1 year after                            | 7800.33***   | 15.96   | 6842.27            | 8758.39   |
| 2 years after                           | 7157.98***   | 15.52   | 6253.48            | 8062.48   |
| 3 years after                           | 6133.45***   | 12.37   | 5160.88            | 7106.02   |
| 4 years after                           | 6196.11***   | 11.10   | 5101.27            | 7290.94   |
| 5 years after                           | 5580.74***   | 9.15    | 4384.28            | 6777.19   |
| Constant                                | 25059.23***  | 100.56  | 24570.60           | 25547.86  |
| No. of observations:                    | 30144        |         |                    |           |
| No. of groups:                          | 3466         |         |                    |           |
| R <sup>2</sup> :                        | 0.0303       |         |                    |           |

**Table A2: Effects of job loss on individual labour income without severance pay.**

Notes: Fixed effects estimates, matched sample; displacement cohorts 1991-2008; yearly incomes in Euro deflated to prices in 2010; \*denotes significance at the 10% level, \*\*at the 5% level and \*\*\*at the 1% level.



**Dependent variable:**

Individual labour income

| <i>Years before/ after displacement</i> | Coefficient  | t-value | 95% Conf. Interval |          |
|---|--------------|---------|--------------------|----------|
| 3 years before*displaced                | -649.64      | -1.18   | -1727.25           | 427.97   |
| 2 years before*displaced                | -1097.20*    | -1.74   | -2331.11           | 136.71   |
| 1 year before*displaced                 | -1450.41**   | -2.50   | -2588.95           | -311.86  |
| Year of displacement*displaced          | -4990.06***  | -6.29   | -6544.64           | -3435.49 |
| 1 year after*displaced                  | -11393.78*** | -13.74  | -13019.75          | -9767.80 |
| 2 years after*displaced                 | -9668.35***  | -12.64  | -11168.37          | -8168.33 |
| 3 years after*displaced                 | -7413.50***  | -9.13   | -9006.45           | -5820.55 |
| 4 years after*displaced                 | -6906.14***  | -8.40   | -8518.84           | -5293.45 |
| 5 years after*displaced                 | -6023.35***  | -6.63   | -7804.94           | -4241.76 |
| 3 years before                          | 1698.91***   | 4.27    | 918.52             | 2479.30  |
| 2 years before                          | 3256.93***   | 7.63    | 2419.73            | 4094.13  |
| 1 year before                           | 5389.08***   | 13.18   | 4587.20            | 6190.97  |
| Year of non-displacement                | 7711.86***   | 18.82   | 6908.57            | 8515.16  |
| 1 year after                            | 7667.05***   | 15.31   | 6685.20            | 8648.89  |
| 2 years after                           | 7198.41***   | 14.93   | 6252.89            | 8143.93  |
| 3 years after                           | 6175.88***   | 12.21   | 5184.16            | 7167.61  |
| 4 years after                           | 6175.41***   | 10.81   | 5055.43            | 7295.39  |
| 5 years after                           | 5488.95***   | 8.83    | 4269.98            | 6707.92  |
| Constant                                | 25222.71***  | 94.02   | 24696.67           | 25748.76 |
| No. of observations:                    | 30144        |         |                    |          |
| No. of groups:                          | 3466         |         |                    |          |
| R <sup>2</sup> :                        | 0.0257       |         |                    |          |

**Table A3: Effects of job loss on individual labour income.**

Notes: Fixed effects estimates, matched sample; displacement cohorts 1991-2008; yearly incomes in Euro deflated to prices in 2010; \*denotes significance at the 10% level, \*\*at the 5% level and \*\*\*at the 1% level.

**Dependent variable:**

Equivalence weighted household labour income

| <i>Years before/ after displacement</i> | Coefficient | t-value | 95% Conf. Interval |          |
|---|-------------|---------|--------------------|----------|
| 3 years before*displaced                | -344.60     | -0.86   | -1127.85           | 438.64   |
| 2 years before*displaced                | -325.29     | -0.62   | -1353.77           | 703.20   |
| 1 year before*displaced                 | -689.37     | -1.35   | -1690.99           | 312.25   |
| Year of displacement*displaced          | -2572.69*** | -4.49   | -3696.98           | -1448.39 |
| 1 year after*displaced                  | -6570.34*** | -10.76  | -7767.71           | -5372.97 |
| 2 years after*displaced                 | -5561.56*** | -8.72   | -6812.10           | -4311.03 |
| 3 years after*displaced                 | -4372.52*** | -6.58   | -5674.95           | -3070.08 |
| 4 years after*displaced                 | -3777.38*** | -5.18   | -5208.14           | -2346.63 |
| 5 years after*displaced                 | -3800.02*** | -5.21   | -5230.67           | -2369.37 |
| 3 years before                          | 807.18***   | 2.82    | 245.51             | 1368.84  |
| 2 years before                          | 1622.45***  | 4.25    | 873.72             | 2371.19  |
| 1 year before                           | 2628.46***  | 7.06    | 1898.41            | 3358.51  |
| Year of non-displacement                | 3815.56***  | 10.22   | 3083.70            | 4547.41  |
| 1 year after                            | 3832.95***  | 9.10    | 3007.31            | 4658.59  |
| 2 years after                           | 3610.90***  | 8.25    | 2753.10            | 4468.70  |
| 3 years after                           | 3138.17***  | 6.79    | 2232.36            | 4043.98  |
| 4 years after                           | 3084.55***  | 6.11    | 2094.43            | 4074.66  |
| 5 years after                           | 2952.69***  | 5.46    | 1892.47            | 4012.91  |
| Constant                                | 25450.78*** | 115.56  | 25018.94           | 25882.63 |
| No. of observations:                    | 30144       |         |                    |          |
| No. of groups:                          | 3466        |         |                    |          |
| R <sup>2</sup> :                        | 0.0136      |         |                    |          |

**Table A4: Effects of job loss on equivalence weighted household labour income.**

Notes: Fixed effects estimates, matched sample; displacement cohorts 1991-2008; yearly incomes in Euro deflated to prices in 2010; \*denotes significance at the 10% level, \*\*at the 5% level and \*\*\*at the 1% level.

**Dependent variable:**

Equivalence weighted pre-government household income

| <i>Years before/ after displacement</i> | Coefficient | t-value | 95% Conf. Interval |          |
|---|-------------|---------|--------------------|----------|
| 3 years before*displaced                | -349.91     | -0.87   | -1140.92           | 441.10   |
| 2 years before*displaced                | -228.44     | -0.44   | -1257.77           | 800.89   |
| 1 year before*displaced                 | -597.84     | -1.17   | -1599.13           | 403.44   |
| Year of displacement*displaced          | -2463.28*** | -4.28   | -3590.56           | -1336.00 |
| 1 year after*displaced                  | -6407.14*** | -10.40  | -7615.24           | -5199.04 |
| 2 years after*displaced                 | -5621.78*** | -8.75   | -6881.02           | -4362.53 |
| 3 years after*displaced                 | -4347.04*** | -6.49   | -5660.99           | -3033.09 |
| 4 years after*displaced                 | -3580.43*** | -4.70   | -5073.04           | -2087.82 |
| 5 years after*displaced                 | -3583.47*** | -4.70   | -5079.10           | -2087.85 |
| 3 years before                          | 835.44***   | 2.89    | 269.37             | 1401.52  |
| 2 years before                          | 1639.18***  | 4.27    | 886.78             | 2391.59  |
| 1 year before                           | 2587.78***  | 6.94    | 1856.52            | 3319.03  |
| Year of non-displacement                | 3769.36***  | 10.10   | 3037.77            | 4500.95  |
| 1 year after                            | 3870.22***  | 9.21    | 3046.53            | 4693.91  |
| 2 years after                           | 3681.58***  | 8.41    | 2822.99            | 4540.17  |
| 3 years after                           | 3197.84***  | 6.85    | 2282.98            | 4112.70  |
| 4 years after                           | 3173.52***  | 6.26    | 2179.34            | 4167.69  |
| 5 years after                           | 3103.95***  | 5.69    | 2034.41            | 4173.48  |
| Constant                                | 26072.69*** | 116.73  | 25634.71           | 26510.67 |
| No. of observations:                    | 30144       |         |                    |          |
| No. of groups:                          | 3466        |         |                    |          |
| R <sup>2</sup> :                        | 0.0126      |         |                    |          |

**Table A5: Effects of job loss on equivalence weighted pre-government household income**

Notes: Fixed effects estimates, matched sample; displacement cohorts 1991-2008; yearly incomes in Euro deflated to prices in 2010; \*denotes significance at the 10% level, \*\*at the 5% level and \*\*\*at the 1% level.

**Dependent variable:**

Equivalence weighted pre-government household income minus income taxes

| <i>Years before/ after displacement</i> | Coefficient | t-value | 95% Conf. Interval |          |
|---|-------------|---------|--------------------|----------|
| 3 years before*displaced                | -208.78     | -0.74   | -763.59            | 346.04   |
| 2 years before*displaced                | -84.30      | -0.23   | -793.79            | 625.20   |
| 1 year before*displaced                 | -330.23     | -0.89   | -1055.66           | 395.20   |
| Year of displacement*displaced          | -1600.96*** | -3.95   | -2394.92           | -807.01  |
| 1 year after*displaced                  | -4932.49*** | -11.11  | -5803.26           | -4061.72 |
| 2 years after*displaced                 | -4248.63*** | -9.06   | -5167.89           | -3329.36 |
| 3 years after*displaced                 | -3403.54*** | -6.97   | -4360.82           | -2446.26 |
| 4 years after*displaced                 | -2854.39*** | -5.33   | -3903.90           | -1804.88 |
| 5 years after*displaced                 | -2719.18*** | -4.96   | -3794.01           | -1644.34 |
| 3 years before                          | 623.18***   | 3.17    | 238.23             | 1008.14  |
| 2 years before                          | 1189.24***  | 4.64    | 687.11             | 1691.38  |
| 1 year before                           | 2027.58***  | 7.63    | 1506.32            | 2548.85  |
| Year of non-displacement                | 2965.31***  | 11.00   | 2436.83            | 3493.79  |
| 1 year after                            | 2999.38***  | 10.09   | 2416.31            | 3582.45  |
| 2 years after                           | 2838.61***  | 8.97    | 2218.31            | 3458.91  |
| 3 years after                           | 2535.02***  | 7.48    | 1870.12            | 3199.92  |
| 4 years after                           | 2467.37***  | 6.79    | 1754.35            | 3180.39  |
| 5 years after                           | 2371.05***  | 6.14    | 1614.17            | 3127.94  |
| Constant                                | 21778.24*** | 133.86  | 21459.21           | 22097.27 |
| No. of observations:                    | 30144       |         |                    |          |
| No. of groups:                          | 3466        |         |                    |          |
| R <sup>2</sup> :                        | 0.0151      |         |                    |          |

**Table A6: Effects of job loss on equivalence weighted pre-government household income minus income taxes.**

Notes: Fixed effects estimates, matched sample; displacement cohorts 1991-2008; yearly incomes in Euro deflated to prices in 2010; \*denotes significance at the 10% level, \*\*at the 5% level and \*\*\*at the 1% level.

**Dependent variable:**

Equivalence weighted net household income

| <i>Years before/ after displacement</i> | Coefficient | t-value | 95% Conf. Interval |          |
|---|-------------|---------|--------------------|----------|
| 3 years before*displaced                | -155.44     | -0.65   | -622.37            | 311.48   |
| 2 years before*displaced                | 33.09       | 0.11    | -561.42            | 627.61   |
| 1 year before*displaced                 | -111.74     | -0.37   | -708.55            | 485.07   |
| Year of displacement*displaced          | -686.93**   | -2.03   | -1351.65           | -22.21   |
| 1 year after*displaced                  | -3494.59*** | -9.52   | -4214.11           | -2775.06 |
| 2 years after*displaced                 | -3048.65*** | -7.95   | -3800.71           | -2296.60 |
| 3 years after*displaced                 | -2404.12*** | -5.94   | -3198.38           | -1609.85 |
| 4 years after*displaced                 | -1942.72*** | -4.29   | -2830.08           | -1055.36 |
| 5 years after*displaced                 | -1905.30*** | -4.14   | -2807.57           | -1003.03 |
| 3 years before                          | 445.19***   | 2.65    | 115.32             | 775.06   |
| 2 years before                          | 793.61***   | 3.67    | 369.32             | 1217.90  |
| 1 year before                           | 1296.56***  | 5.92    | 867.32             | 1725.80  |
| Year of non-displacement                | 1923.42***  | 8.70    | 1489.82            | 2357.02  |
| 1 year after                            | 2014.32***  | 8.17    | 1530.81            | 2497.84  |
| 2 years after                           | 1911.53***  | 7.35    | 1401.85            | 2421.21  |
| 3 years after                           | 1731.47***  | 6.19    | 1182.65            | 2280.29  |
| 4 years after                           | 1709.52***  | 5.67    | 1118.80            | 2300.24  |
| 5 years after                           | 1697.72***  | 5.30    | 1069.60            | 2325.83  |
| Constant                                | 17359.39*** | 128.93  | 17095.37           | 17623.41 |
| No. of observations:                    | 30144       |         |                    |          |
| No. of groups:                          | 3466        |         |                    |          |
| R <sup>2</sup> :                        | 0.0115      |         |                    |          |

**Table A7: Effects of job loss on equivalence weighted net household income.**

Notes: Fixed effects estimates, matched sample; displacement cohorts 1991-2008; yearly incomes in Euro deflated to prices in 2010; \*denotes significance at the 10% level, \*\*at the 5% level and \*\*\*at the 1% level.

**Dependent variable:**

Equivalence weighted post-government household income

| <i>Years before/ after displacement</i> | Coefficient | t-value | 95% Conf. Interval |          |
|---|-------------|---------|--------------------|----------|
| 3 years before*displaced                | -183.10     | -0.83   | -617.39            | 251.19   |
| 2 years before*displaced                | 122.28      | 0.44    | -423.78            | 668.34   |
| 1 year before*displaced                 | 58.60       | 0.21    | -485.54            | 602.73   |
| Year of displacement*displaced          | 602.26*     | 1.90    | -20.14             | 1224.65  |
| 1 year after*displaced                  | -1693.32*** | -5.23   | -2328.59           | -1058.05 |
| 2 years after*displaced                 | -1879.83*** | -5.55   | -2544.46           | -1215.20 |
| 3 years after*displaced                 | -1480.11*** | -4.06   | -2194.78           | -765.45  |
| 4 years after*displaced                 | -1086.40*** | -2.65   | -1891.25           | -281.55  |
| 5 years after*displaced                 | -1260.22*** | -3.05   | -2070.04           | -450.40  |
| 3 years before                          | 496.45***   | 3.13    | 185.86             | 807.04   |
| 2 years before                          | 867.07***   | 4.35    | 476.32             | 1257.81  |
| 1 year before                           | 1125.54***  | 5.64    | 734.13             | 1516.96  |
| Year of non-displacement                | 1511.15***  | 7.47    | 1114.33            | 1907.97  |
| 1 year after                            | 1884.93***  | 8.41    | 1445.20            | 2324.66  |
| 2 years after                           | 2019.85***  | 8.66    | 1562.68            | 2477.02  |
| 3 years after                           | 1979.85***  | 7.84    | 1484.64            | 2475.06  |
| 4 years after                           | 2046.37***  | 7.52    | 1512.78            | 2579.97  |
| 5 years after                           | 2240.39***  | 7.85    | 1680.73            | 2800.06  |
| Constant                                | 19358.75*** | 159.14  | 19120.22           | 19597.28 |
| No. of observations:                    | 30144       |         |                    |          |
| No. of groups:                          | 3466        |         |                    |          |
| R <sup>2</sup> :                        | 0.0071      |         |                    |          |

**Table A8: Effects of job loss on equivalence weighted post-government household income.**

Notes: Fixed effects estimates, matched sample; displacement cohorts 1991-2008; yearly incomes in Euro deflated to prices in 2010; \*denotes significance at the 10% level, \*\*at the 5% level and \*\*\*at the 1% level.

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